

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Haataja et al.
Docket: 2316.869US01
Title: OPTICAL CABLE EXIT TROUGH WITH BYPASS

CERTIFICATE UNDER 37 CFR 1.10

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By: 

Name: William Smith

BOX PATENT APPLICATION
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Washington, D.C. 20231

Sir:

We are transmitting herewith the attached:

- ☒ Transmittal sheet, in duplicate, containing Certificate under 37 CFR 1.10.
- ☒ Utility Patent Application: Spec. 7 pgs; 4 claims; Abstract 1 pgs.
The fee has been calculated as shown below in the 'Claims as Filed' table.
- ☒ Nine (9) sheets of formal drawings
- ☒ A signed Combined Declaration and Power of Attorney
- ☒ Assignment of the invention to ADC Telecommunications, Inc., Recordation Form Cover Sheet
- ☒ A check in the amount of \$790.00 to cover the Filing Fee
- ☒ A check for \$40.00 to cover the Assignment Recording Fee.
- ☒ Return postcard

CLAIMS AS FILED

Number of Claims Filed	In Excess of:	Number Extra	Rate	Fee
Basic Filing Fee				\$790.00
Total Claims				
4	20	0	x 22.00	= \$0.00
Independent Claims				
2	3	0	x 82.00	= \$0.00
MULTIPLE DEPENDENT CLAIM FEE				\$0.00
TOTAL FILING FEE				\$790.00

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MERCHANT, GOULD, SMITH, EDELL,
WELTER & SCHMIDT
3100 Norwest Center, Minneapolis, MN 55402
(612) 332-5300

By: 

Name: Steven C. Bruess

Reg. No.: 34,130

Initials: SCB:ju

OPTIC CABLE EXIT TROUGH WITH BYPASS

Field of the Invention

5 The invention pertains to a system for the management and routing of optical fiber cables.

Background of the Invention

In the telecommunications industry, the use of optical fibers for signal transmissions is accelerating. With the increased utilization of optical fiber systems, optical fiber cable management requires industry attention.

10 One area where optical fiber management is necessary is the routing of optical fibers from one piece of optical fiber equipment to another. For example, in a telecommunications facility, optical fiber cables may be routed between fiber distribution equipment and optical line terminating equipment. In buildings and other structures which carry such equipment, the cable routing can take place in concealed
15 ceiling areas or in any other manner to route cables from one location to another.

When routing optical fibers, it is desirable to have at least one cable extend generally horizontally through a lateral trough section of a cable routing system, and to also have the capability to exit one or more cables from the lateral trough section. Also, there is a need to provide storage in connection with lateral trough sections. A
20 further need is for storage of cable components, such as connectors within the cable routing system. Also, and perhaps most important, any routing system must protect optical fibers from damage. In the use of optical fibers, it is recognized that the fibers should not be bent beyond a minimum radius of curvature. For example, it is commonly recognized that optical fibers should not be bent in a radius of less than 1.5
25 inches.

In some cable routing systems, copper cables may extend coextensively with the optical fiber cables. There is a need to manage these two different cables in the cable routing system.

Summary of the Invention

5 According to preferred embodiments of the present invention, a cable trough is disclosed for routing optical fiber or other cables between transmission equipment. The trough includes two upstanding sides and a bottom. In one embodiment, the cable trough includes an enlarged central portion defining a downwardly extending central exit trough portion, and two cable bypass portions on
10 opposite sides of the central trough portion. Separator walls extend upwardly within the cable trough to separate the bypass portions from the central exit trough portion. At least one cable storage wall may be positioned in the cable trough between the central exit trough portion and one of the upstanding sides to define a cable storage pathway. A component support flange may be provided and extends inwardly from one of the sides
15 of the cable trough. The flange supports a component for connecting to one of the optical fiber cables. An alternative embodiment of a cable trough includes an enlarged central portion defining a central bypass portion, and two downwardly extending exit trough portions disposed on opposite sides of the central bypass portion. Separator walls extend upwardly within the cable trough to separate the central bypass trough
20 portion from the exit trough portions.

Brief Description of the Drawings

FIG. 1 is a top, side, and end perspective view of a first embodiment of a cable trough.

FIG. 2 is a bottom, side, and end view of the cable trough shown in FIG.

25 1.

FIG. 3 is a top view of the cable trough shown in FIG. 1, and showing exemplary cables.

FIG. 4 is a top, side, and end perspective view of a second embodiment of a cable trough.

FIG. 5 is a bottom, side, and end view of the cable trough shown in FIG. 4.

FIG. 6 is a top view of the cable trough shown in FIG. 4, and showing exemplary cables.

FIG. 7 is a top, side, and end perspective view of a third embodiment of a cable trough.

FIG. 8 is a bottom, side, and end view of the cable trough shown in FIG. 7.

FIG. 9 is a top view of the cable trough shown in FIG. 7.

Detailed Description of the Preferred Embodiments

Referring now to FIGS. 1-9, three embodiments of a cable trough 100, 200, 300 are shown. Cable troughs 100, 200, 300 are lateral trough sections utilized in an optical fiber cable routing system which carries optical fibers from one location to another within a structure, such as a building having optical fiber signal transmitting equipment. It is intended that the cable troughs 100, 200, 300 would be suspended from a ceiling structure by any suitable means (not shown). Cable troughs 100, 200, 300 are usable in cable routing systems of the type disclosed in U.S. Patent Nos. 5,067,678 and 5,316,243, the disclosures of which are hereby incorporated by reference. Cable troughs 100, 200, 300 may also be used to route copper cables from one location to another in addition to routing optical fiber cables.

Cable troughs 100, 200, 300 are related in that each provides a cable exit portion which allows downward exiting of a cable from the trough, as well as a cable bypass portion which allows other cables to bypass the downward exit portion.

Referring now to FIGS. 1-3, trough 100 includes a first end 102 and an opposite end 104. Trough 100 includes a bottom 106 and two upstanding sides 108, 110. Trough 100 generally includes an enlarged central portion 112 defining first and

second cable bypass portions 114, 116. Bottom 106 further defines an exit opening 118 through a center of trough 100. Exit opening 118 of trough 100 is formed by an exit trough portion 120 defining curved surfaces for cable protection. Positioned between each respective side 108, 110 and exit trough portion 120 are upwardly extending
5 separator walls 122, 124. As shown in FIG. 3, separator walls 122, 124 are generally C-shaped. Separator wall 122 and side 108, along with bottom 106 defines a first cable bypass pathway 114. Separator wall 124 and side 110 defines a second cable bypass pathway 116.

Ends 102 and 104 are connectable to other cable routing components,
10 such as horizontal trough sections, as desired through any suitable means, such as those structures disclosed in U.S. Patent Nos. 5,067,678 and 5,316,243, or the structures disclosed in pending application 08/818,492, the disclosure of which is incorporated by reference. The inside and/or outside surfaces of trough 100 can be configured as appropriate to mate with the other cable routing components.

Referring now to FIG. 3, various cables 140, 142, 144, 146, 148, 150 are
15 shown routing through trough 100. Cables 140 and 142 pass through trough 100 from first end 102 to second end 104. More specifically, cables 140 and 142 pass from a cable pathway 103 at end 102 through bypass pathway 114 to a cable pathway 105 at end 104. Cables 144 and 146 pass from cable pathway 103 to exit trough portion 120 to
20 exit downwardly from trough 100. Cables 148 and 150 pass from cable pathway 103 through bypass pathway 116 to cable pathway 105. Separator walls 122 and 124 help maintain the cables within one of the bypass pathways 114 and 116. The enlarged central portion 112 helps avoid overly compacting the cables which bypass through trough 100 and do not exit through exit trough portion 120. As shown in FIGS. 1-3,
25 sides 108, 110 and separator walls 122, 124 are provided with curved wall portions to help avoid cable damage by not going below the minimum bending radius of the cable.

Referring now to FIGS. 4-6, trough 200 includes a first end 202 and an opposite end 204. Trough 200 includes a bottom 206 and two upstanding sides 208, 210. Trough 200 generally includes an enlarged central portion 212 defining first and

second cable bypass portions 214, 216. Bottom 206 further defines an exit opening 218 through a center of trough 200. Exit opening 218 of trough 200 is formed by an exit trough portion 220 defining curved surfaces for cable protection. Positioned between each respective side 208, 210 and exit trough portion 220 are upwardly extending separator walls 222, 224. As shown in FIG. 6, separator walls 222, 224 are generally C-shaped with outwardly tapered ends. Separator wall 222 and side 208, along with bottom 206 defines a first cable bypass pathway 214. Separator wall 224 and side 210 defines a second cable bypass pathway 216.

Referring now to FIG. 6, various cables 240, 242, 248, 250 are shown routing through trough 200. Cables 240 and 242 pass through trough 200 from first end 202 to second end 204. More specifically, cables 240 and 242 pass from a cable pathway 203 at end 202 through bypass pathway 214 to a cable pathway 205 at end 204. Cables 248 and 250 pass from cable pathway 203 through bypass pathway 216 to cable pathway 205. Separator walls 222 and 224 help maintain the cables within one of the bypass pathways 214 and 216. The enlarged central portion 212 helps avoid overly compacting the cables which bypass through trough 200 and do not exit through exit trough portion 220. As shown in FIGS. 4-6, sides 208, 210 and separator walls 222, 224 are provided with curved wall portions to help avoid cable damage by not going below the minimum bending radius of the cable.

Referring now to FIGS. 4 and 6, trough 200 further includes a component support flange 226 extending inwardly from side 208. Flange 226 supports various components 228 which are utilized with the cables. See for example cable 240 mounted to one of the components 228 mounted to flange 226. Examples of components 228 which may be utilized include connectors, adapters, splitters/combiners, attenuators, splicings, switches, wave division multiplexers, amplifiers, and the like.

Exit trough 200 further includes a cable storage feature including upwardly extending storage walls 230, 231, 232, and 233. Storage walls 230-233 define a cable storage pathway 234 around exit trough portion 220 and inside of separator

walls 222, 224. In the case of cable 252 passing through trough 200 from cable pathway 203 and into an area between separator walls 222, 224. Cable 252 is wound around storage walls 230-233 any number of times as desired, then passes through gap 236, and then exits trough 200 at exit trough portion 220. Storage walls 230, 232 are generally oval-shaped, and storage walls 231, 233 are smaller wall segments each with a slight outward curvature toward storage pathway 234. Other storage walls 230-233 are possible including more or less than the number shown, and in different positions. Generally it is desirable to provide sufficient structure to position all of the cables desiring storage within the storage pathway 234, without going below the minimum bending radius of the cable. Instead of exiting trough 200 at exit trough portion 220, cable 252 can pass through to pathway 205.

Referring now to FIGS. 7-9, trough 300 includes a first end 302, and an opposite end 304. A bottom 306 includes upwardly extending sides 308, 309, 310, 311 to define an enlarged central portion 312. A central bypass pathway 314 links end pathways 303 and 305. Side openings 320, 321 form two cable exit trough portions 316, 318 on opposite sides of central bypass pathway 314. Upwardly extending separator walls 322, 324 separate each exit trough portion 316, 318 from central bypass portion 314. Separator walls 322, 324 are generally planar as shown in FIG. 9. Separator walls 322, 324 each create an exit pathways 330, 332, respectively for cable from pathways 303, 305. Exit trough portion 316 includes two downwardly curved bottom surface portions 325, 326. Exit trough portion 318 includes two downwardly curved trough portions 327, 328. Ends 302, 304 are connectable to other cable routing components, as desired. Curved sides 308-311 and the curved surfaces of each exit trough portion 316, 318 protect the cables from going below the minimum bending radius. Trough 300 also includes cable access gaps 340, 342 in the upstanding sidewalls adjacent to exit trough portions 316, 318.

Cables can pass through trough 300 from end 302 to end 304 through central bypass pathway 314, or one or more cables can exit downwardly through one of exit trough portions 316, 318. The enlarged central portion 312 helps avoid overly

compacting the cables which bypass through trough 300, and do not exit through exit trough portions 316, 318.

While troughs 100, 200, 300 are usable with optical fiber cables, copper cables may also be routed through troughs 100, 200, 300 simultaneously with the
5 optical fiber cables. In that case the dual bypass pathways of troughs 100, 200, and the dual exit trough portions 316, 318 of trough 300 can be used to segregate the cables, as desired.

Having described the present invention in a preferred embodiment, modifications and equivalents may occur to one skilled in the art. It is intended that
10 such modifications and equivalents shall be included within the scope of the claims which are appended hereto.

central portion than on each end to define an enlarged central portion of the cable trough;

the enlarged central portion of the cable trough including two downwardly extending side exit trough portions through the bottom portion;

two upstanding separator walls extending upwardly from the bottom portion, one separator wall positioned adjacent to each exit trough portion, each separator wall positioned on opposite sides of the bottom portion, each separator wall laterally spaced from each other to each define a central cable bypass pathway between the first and second ends.

039449-1-13

Abstract of the Disclosure

A cable trough is provided including a bottom portion and two upstanding sides extending from the bottom portion to define a cable pathway. The upstanding sides define an enlarged central portion of the cable trough, and the bottom portion including at least one exit trough portion. The exit trough portion can be centrally located, with a bypass pathway on either side. At least one separator wall is provided to separate the exit trough portion from each bypass pathway. A component flange is also provided extending from one of the upstanding sides. The cable trough can also include a cable storage pathway. Alternatively, two exit trough portions can be positioned on opposite sides of the cable trough adjacent each upstanding side, and on opposite sides of a central bypass pathway.

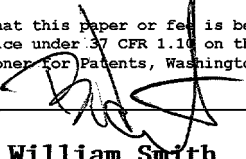
<small>CERTIFICATE UNDER 37 CFR 1.10:</small>	
"Express Mail" mailing label number:	EM554941337US
Date of Deposit:	November 17, 1997
<small>I hereby certify that this paper or fee is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231.</small>	
By:	
Name:	William Smith

FIG. 1

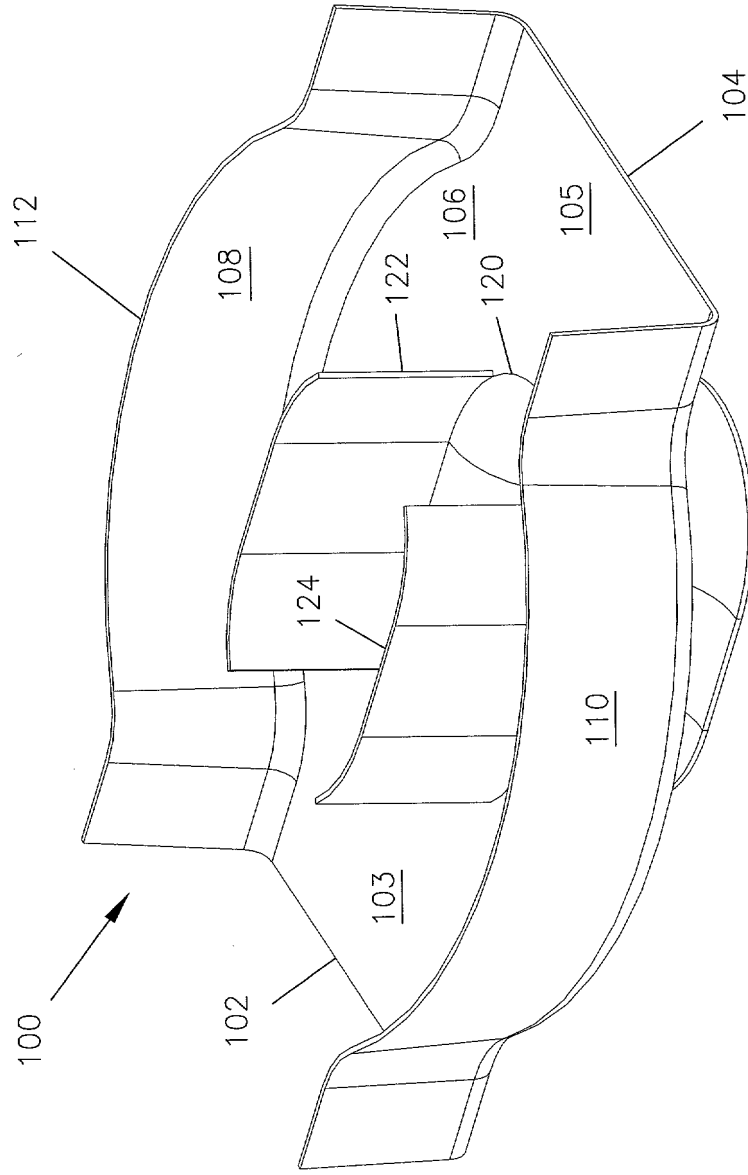


FIG. 2

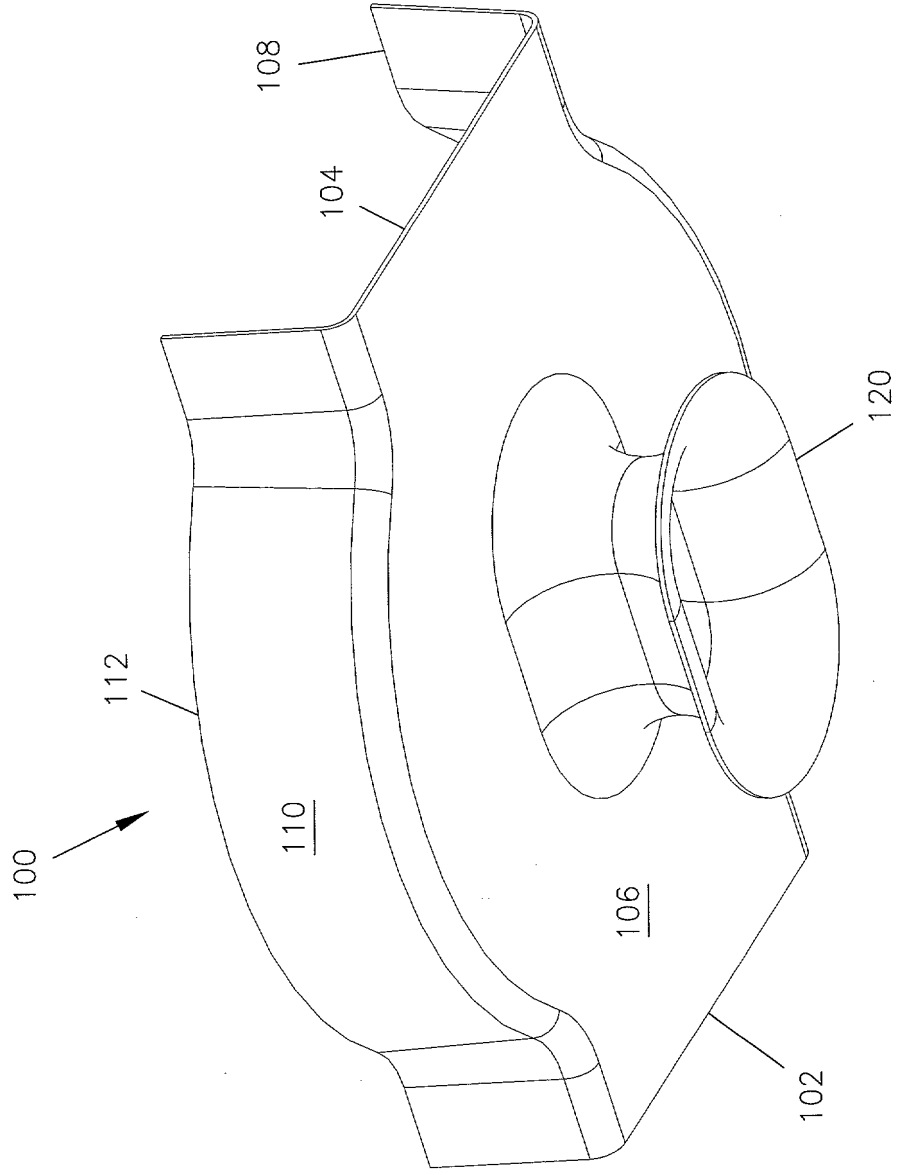


FIG. 3

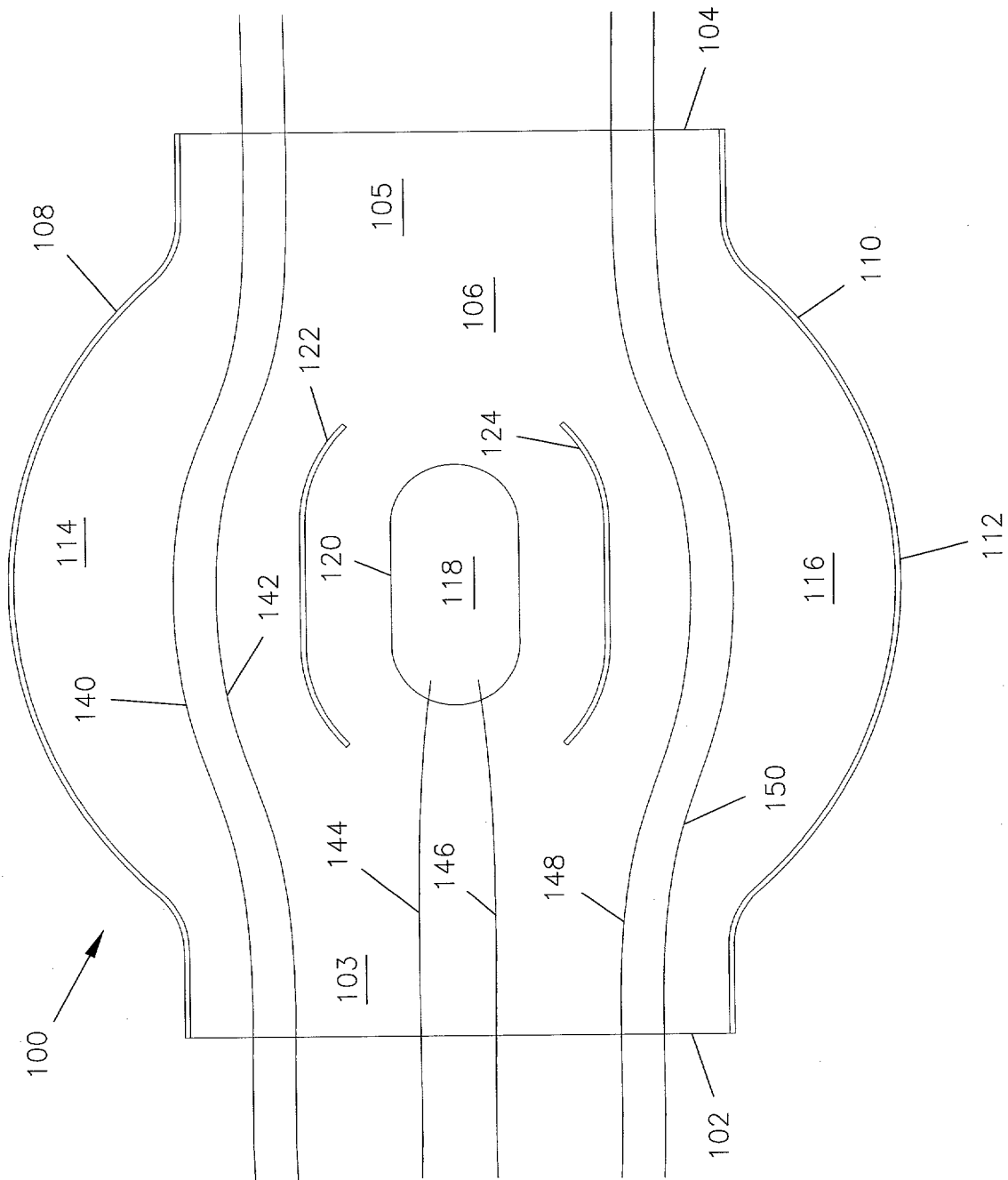


FIG. 4

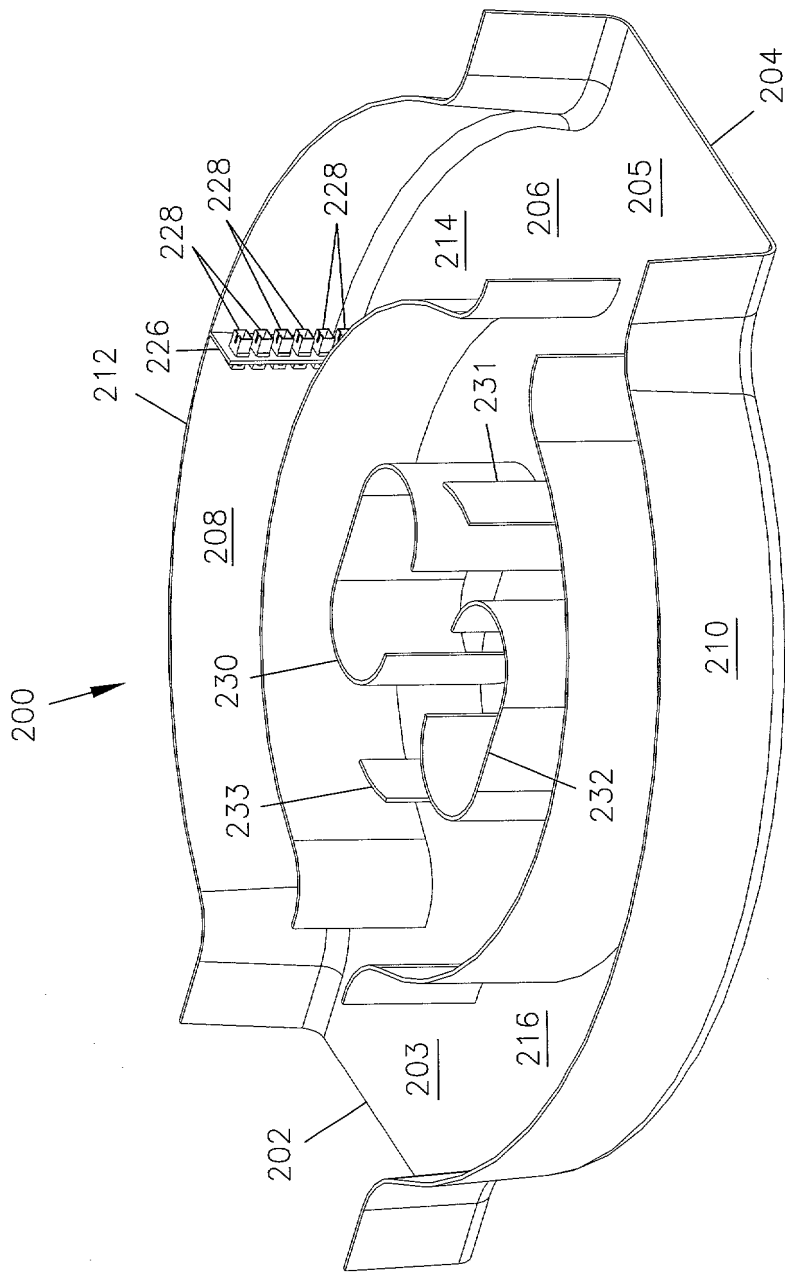


FIG. 5

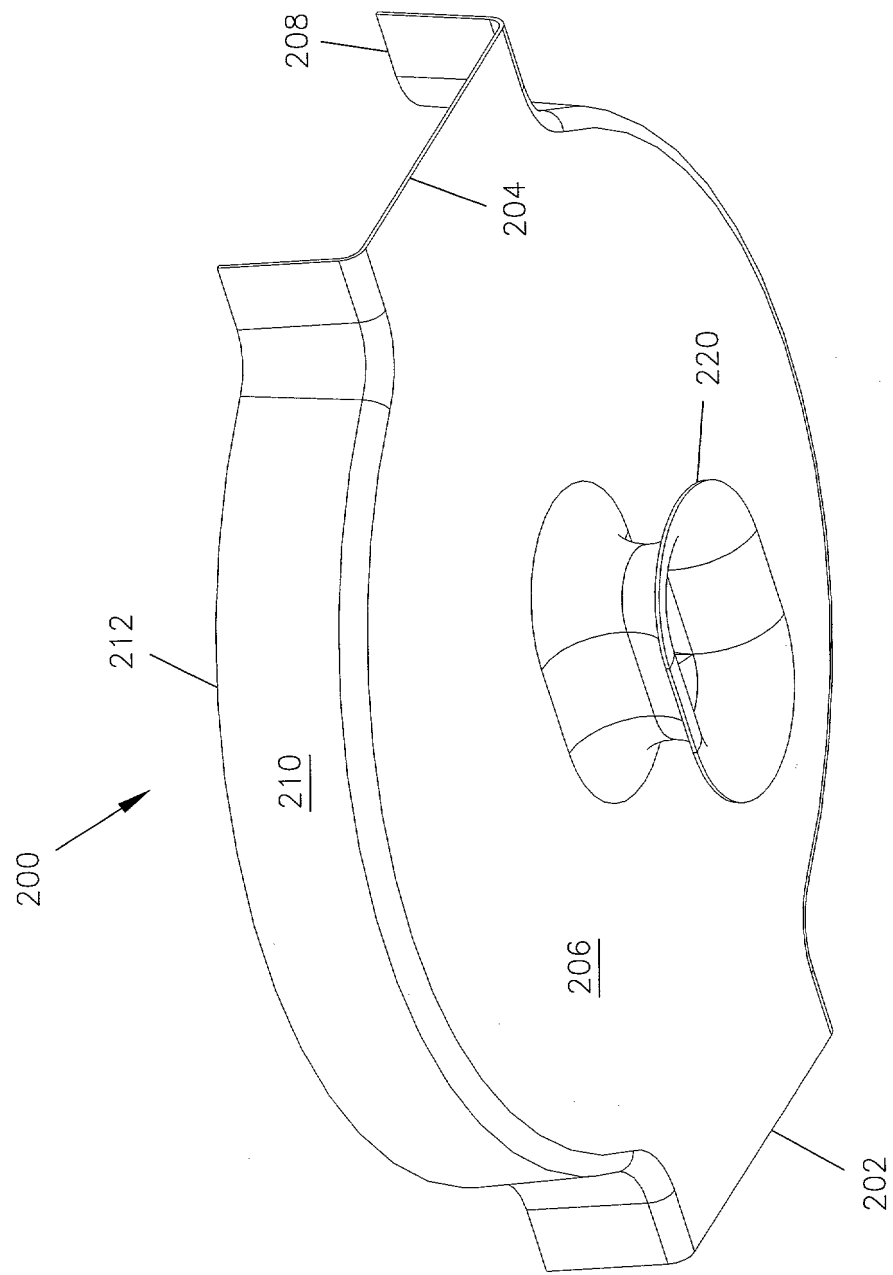




FIG. 6

FIG. 7

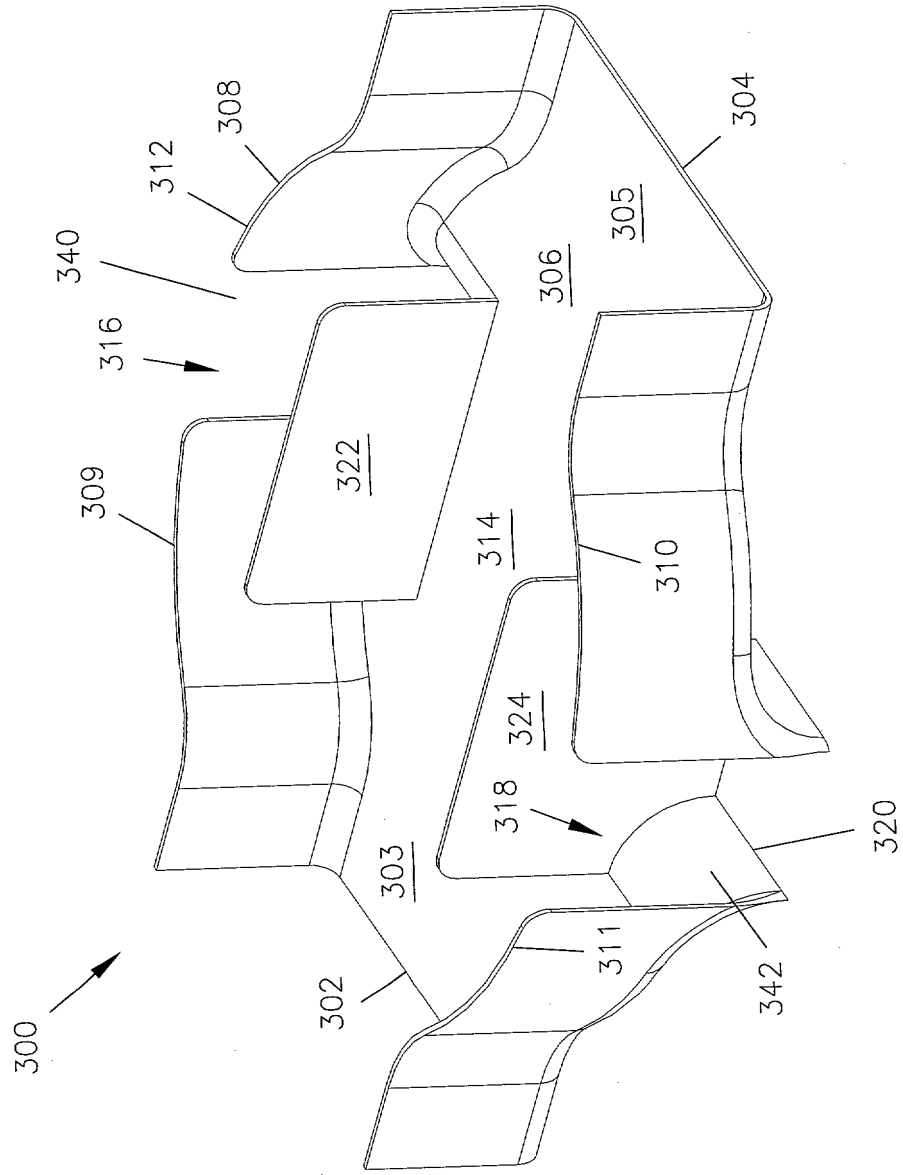


FIG. 8

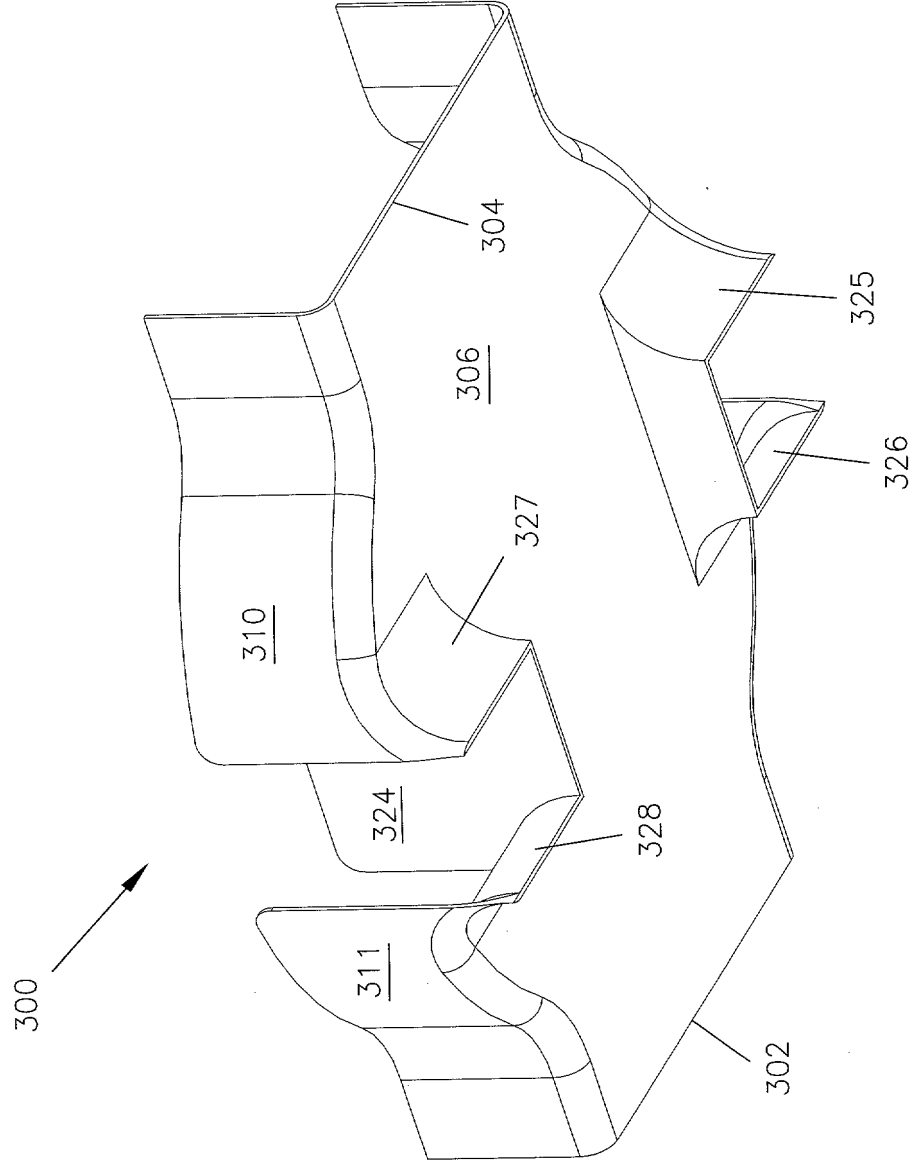
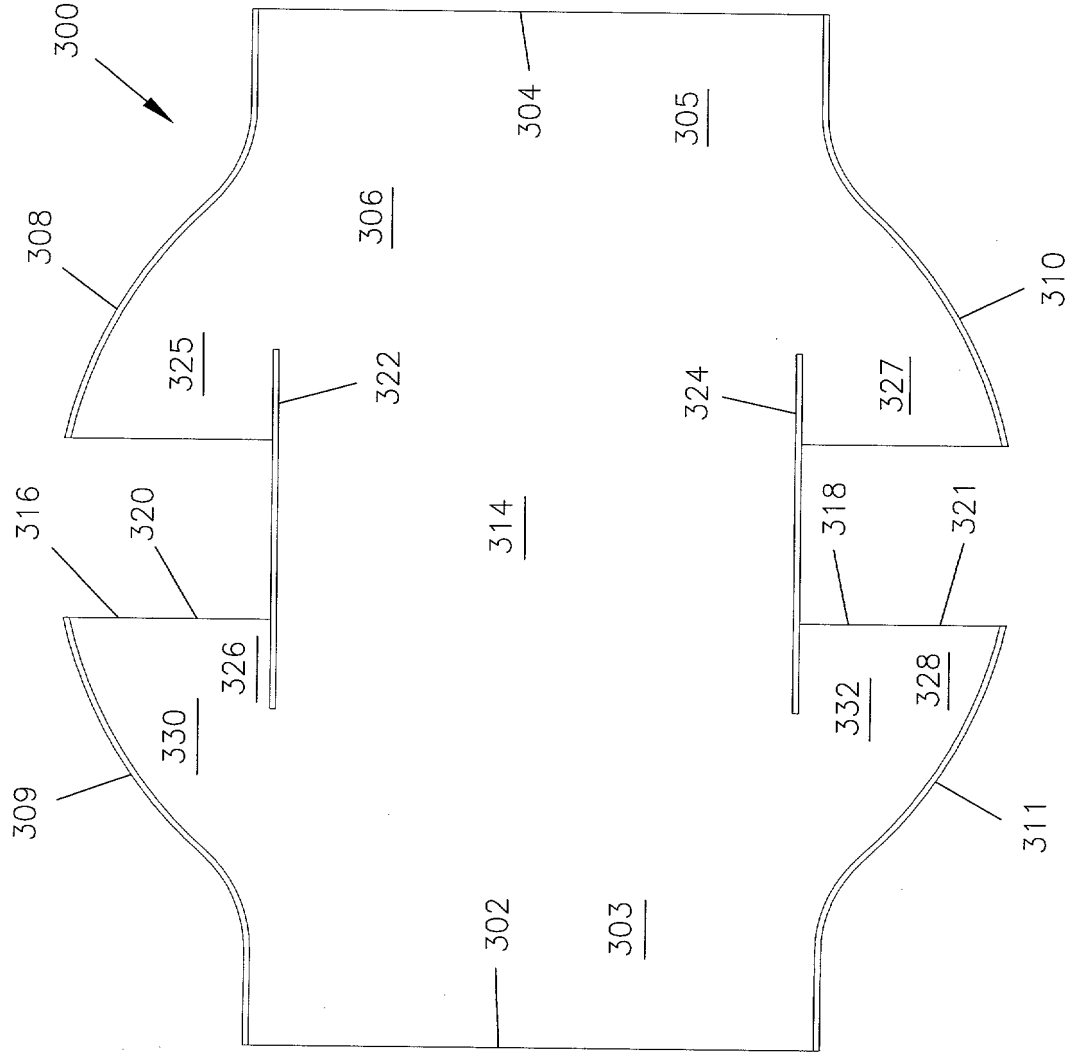


FIG. 9



United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: OPTICAL CABLE EXIT TROUGH WITH BYPASS

The specification of which

a. ☒ is attached hereto

b. ☐ was filed on as application serial no. and was amended on (if applicable) (in the case of a PCT-filed application) described and claimed in international no. filed and as amended on (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (attached hereto).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

a. ☒ no such applications have been filed.

b. ☐ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Adriano, Sarah B.	Reg. No. 34,470	Kowalchuk, Katherine M.	Reg. No. 36,848
Albrecht, John W.	Reg. No. 40,481	Lacy, Paul E.	Reg. No. 38,946
Batzli, Brian H.	Reg. No. 32,960	Larson, James A.	Reg. No. 40,443
Beard, John L.	Reg. No. 27,612	Lasky, Michael B.	Reg. No. 29,555
Beck, Robert C.	Reg. No. 28,184	Lindquist, Timothy A.	Reg. No. 40,701
Berman, Charles	Reg. No. 29,249	Lynch, David W.	Reg. No. 36,204
Bogucki, Raymond A.	Reg. No. 17,426	Mau, Michael L.	Reg. No. 30,087
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Canady, Karen S.	Reg. No. 39,927	McDonald, Daniel W.	Reg. No. 32,044
Carlson, Alan G.	Reg. No. 25,959	McIntyre, Iain A.	Reg. No. 40,377
Carter, Charles G.	Reg. No. 35,093	Mueller, Douglas P.	Reg. No. 30,300
Caspers, Philip P.	Reg. No. 33,227	Nasiedlak, Tyler L.	Reg. No. 40,099
Chiapetta, James R.	Reg. No. 39,634	Nelson, Albin J.	Reg. No. 28,650
Clifford, John A.	Reg. No. 30,247	Orler, Anthony J.	Reg. No. 41,232
Conrad, Timothy R.	Reg. No. 30,164	Pauly, Daniel M.	Reg. No. 40,123
Cooper, Victor G.	Reg. No. 39,641	Plunkett, Theodore	Reg. No. 37,209
Crawford, Robert	Reg. No. 32,122	Pollinger, Steven J.	Reg. No. 35,326
Daignault, Ronald A.	Reg. No. 25,968	Pytel, Melissa J.	Reg. No. P-41,512
Daley, Dennis R.	Reg. No. 34,994	Reich, John C.	Reg. No. 37,703
Dalglish, Leslie E.	Reg. No. 40,579	Reiland, Earl D.	Reg. No. 25,767
Daulton, Julie R.	Reg. No. 36,414	Rittmaster, Ted R.	Reg. No. 32,933
DiPietro, Mark J.	Reg. No. 28,707	Schmaltz, David G.	Reg. No. 39,828
Edell, Robert T.	Reg. No. 20,187	Schmidt, Cecil C.	Reg. No. 20,566
Epp Ryan, Sandra	Reg. No. 39,667	Schuman, Mark D.	Reg. No. 31,197
Farber, Michael B.	Reg. No. 32,612	Schumann, Michael D.	Reg. No. 30,422
Funk, Steven R.	Reg. No. 37,830	Sebald, Gregory A.	Reg. No. 33,280
Gates, George H.	Reg. No. 33,500	Sharp, Janice A.	Reg. No. 34,051
Glance, Robert J.	Reg. No. 40,620	Skoog, Mark T.	Reg. No. 40,178
Golla, Charles E.	Reg. No. 26,896	Smith, Jerome R.	Reg. No. 35,684
Gorman, Alan G.	Reg. No. 38,472	Sumner, John P.	Reg. No. 29,114
Gould, John D.	Reg. No. 18,223	Sumners, John S.	Reg. No. 24,216
Gresens, John J.	Reg. No. 33,112	Tellekson, David K.	Reg. No. 32,314
Hamre, Curtis B.	Reg. No. 29,165	Underhill, Albert L.	Reg. No. 27,403
Hillson, Randall A.	Reg. No. 31,838	Vandenburgh, J. Derek	Reg. No. 32,179
Hollingsworth, Mark A.	Reg. No. 38,491	Victor, David W.	Reg. No. 39,867
Johnston, Scott W.	Reg. No. 39,721	Welter, Paul A.	Reg. No. 20,890
Kastelic, Joseph M.	Reg. No. 37,160	Williams, Douglas J.	Reg. No. 27,054
Kettelberger, Denise	Reg. No. 33,924	Wood, Gregory B.	Reg. No. 28,133
Komanduri, Janaki	Reg. No. 40,684	Xu, Min S.	Reg. No. 39,536
Kowalchuk, Alan W.	Reg. No. 31,535		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant, Gould, Smith, Edell, Welter & Schmidt to the contrary.

Please direct all correspondence in this case to Merchant, Gould, Smith, Edell, Welter & Schmidt at the address indicated below:

Merchant, Gould, Smith, Edell,
Welter & Schmidt
3100 Norwest Center
90 South Seventh Street
Minneapolis, MN 55402-4131

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2	Full Name Of Inventor	Family Name Haataja	First Given Name Timothy	Second Given Name Jon
0	Residence & Citizenship	City Prior Lake	State or Foreign Country Minnesota	Country of Citizenship U.S.A.
1	Post Office Address	Post Office Address 18935 Natchez Avenue	City Prior Lake	State & Zip Code/Country Minnesota 55372 U.S.A.
Signature of Inventor 201: <i>X Timothy J. Haataja</i>				Date: <i>X 11/17/97</i>
2	Full Name Of Inventor	Family Name Kampf	First Given Name Thomas	Second Given Name Walter
0	Residence & Citizenship	City Minnetonka	State or Foreign Country Minnesota	Country of Citizenship U.S.A.
2	Post Office Address	Post Office Address 5606 Pompano Drive	City Minnetonka	State & Zip Code/Country Minnesota 55343 U.S.A.
Signature of Inventor 202: <i>X</i>				Date: <i>X</i>
2	Full Name Of Inventor	Family Name Johnson	First Given Name Wayne	Second Given Name Albin
0	Residence & Citizenship	City Rosemount	State or Foreign Country Minnesota	Country of Citizenship U.S.A.
3	Post Office Address	Post Office Address 16280 Galena Avenue	City Rosemount	State & Zip Code/Country Minnesota 55068 U.S.A.
Signature of Inventor 203: <i>X Wayne A. Johnson</i>				Date: <i>X 11-17-97</i>
2	Full Name Of Inventor	Family Name Nault	First Given Name Gary	Second Given Name F.
0	Residence & Citizenship	City Bloomington	State or Foreign Country Minnesota	Country of Citizenship U.S.A.
4	Post Office Address	Post Office Address 8116 110th Street Circle	City Bloomington	State & Zip Code/Country Minnesota 55438 U.S.A.
Signature of Inventor 204: <i>X Gary F. Nault</i>				Date: <i>X 11/17/97</i>

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim;

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application:

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.